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2019 Ordnance and Ballistics Technology Working Group Meeting

Monterey, California: Naval Postgraduate School

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2019 ORDNANCE AND BALLISTICS TECHNOLOGY WORKING GROUP MEETING

July 30 - August 1, 2019

Naval Postgraduate School
Monterey, CA



2019 ORDNANCE AND BALLISTICS TECHNOLOGY WORKING GROUP MEETING

The objective of the Ordnance and Ballistics Technology Working Group Meeting is to provide researchers, developers, and program managers (from government, academia, and industry) a forum for the exchange of information on current work related to the advancement of the technology and application of ballistics and weapon systems. The meeting provides a forum for classified, export-controlled, and limited distribution papers in the areas of ballistics, weapons effectiveness, and bomb and warhead technology. The symposium is classified at the SECRET/NOFORN level and is limited to the following US agencies: DoD, DoD Contractors, DoE, FBI, CIA, and DHS.



Special thanks to our host
and co-sponsor, the
Naval Postgraduate School!

SCHEDULE AT A GLANCE

MONDAY, JULY 29, 2019

Early Bird Registration

Hyatt Regency Hotel & Spa, Monterey

5:00 – 6:30 PM

TUESDAY, JULY 30, 2019

Registration & Security Check-In

Naval Postgraduate School - Glasgow Hall
Courtyard

7:00 – 8:00 AM

General Session & Plenary Speaker

8:00 – 9:00 AM

Session I: Penetration Mechanics

9:00 – 10:25 AM

Session II: Warhead Technology – Shaped Charge and EFP

10:45 – 1:55 PM

Session III: Energetics – Explosives and Propellants

2:15 – 4:40 PM

Reception

Hyatt Regency Hotel & Spa, Monterey

5:00 – 7:00 PM

WEDNESDAY, JULY 31, 2019

Registration & Security Check-In

Naval Postgraduate School - Glasgow
Hall Courtyard

7:00 – 8:00 AM

General Session & Invited Speaker

8:00 – 9:00 AM

Session IV: Ballistics

8:30 – 11:35 AM

Session V: Reactive Materials

11:35 – 3:05 PM

THURSDAY, AUGUST 1, 2019

Registration & Security Check-In

Naval Postgraduate School - Glasgow
Hall Courtyard

7:00 – 8:00 AM

General Session & Invited Speaker

8:00 – 9:00 AM

Session VI: Blast and Frags

3:25 – 5:10 PM

Session VII: Protection Systems

11:45 – 3:15 PM



MONDAY, JULY 29, 2019

5 - 6:30 PM **EARLY BIRD REGISTRATION**
HYATT REGENCY MONTEREY HOTEL AND SPA IN MONTEREY

TUESDAY, JULY 30, 2019

7:30 AM **REGISTRATION AND SECURITY CHECK-IN**
NAVAL POSTGRADUATE SCHOOL, GLASGOW HALL COURTYARD

8:00 AM **INTRODUCTORY REMARKS**
GLASGOW 102

James Miller
Dynetics, Huntsville, AL
Meeting Co-Chair

Robert D. Ciccarelli
DE Technologies, Inc., King of Prussia, PA
Meeting Co-Chair

8:15 AM **INVITED PRESENTATION**

Dr. John D. Corley
Ordnance Sciences Core Technical Competency Lead, Air Force Research Laboratory, Eglin AFB, FL

SESSION I: PENETRATION MECHANICS

9:00 AM **SESSION INTRODUCTION**
GLASGOW 102

Edward Kennedy
Army Research Laboratory, Aberdeen, MD
Session Chair

9:05 AM **PENETRATION-EFFICIENT COMPOSITE KINETIC ENERGY PENETRATORS**

Brett Sorensen
U.S. Army Research Laboratory, APG, MD

Lee Magness • Timothy Cler

9:25 AM **TERMINAL EFFECTS OF A NON-TRADITIONAL HYPERVELOCITY NAVAL STRIKE WEAPON**

David West
Naval Post Graduate School, Monterey, CA

Joseph Hooper

**9:45 AM MEASURING THE EFFECT OF NOSE SHAPE ON PENETRATOR PERFORMANCE -
NEW TEST DATA AND SCALABLE PENETRATION TRENDS**

Nicolas Jarrett
Applied Research Associates, Albuquerque, NM

Alma Oliphant • Craig Doolittle • Bryan Norris

**10:05 AM 105MM IGNITION SYSTEM FLAME FRONT CHARACTERIZATION AND DESIGN
ADVANCES**

Paul Henderson
CCDC-AC, Picatinny Arsenal, NJ

Joe Cosme • Christopher Csernica

**10:25 AM COFFEE BREAK
GLASGOW HALL COURTYARD**

SESSION II: WARHEAD TECHNOLOGY – SHAPED CHARGE AND EFP

**10:45 AM SESSION INTRODUCTION
GLASGOW 102**

Michael Steinberg
GD-OTS, Niceville, FL
Session Chair

Nick Peterson
US Army CCDC Aviation and Missile Center, Redstone Arsenal, AL
Session Chair

**10:50 AM FURTHER DEVELOPMENT OF TANDEM WARHEADS FOR A MULTIPURPOSE
SHOULDER LAUNCHED MISSILE SYSTEM**

Daniel Suarez
US Army RDECOM-ARDEC, Picatinny, NJ

David Pfau • Jack Pincay • Greg Stunzenas

11:10 AM JAVELIN FORM FACTOR COMPACT SHAPED CHARGE

Erik Goetzke
Northrop Grumman IS, Plymouth, MN

Nick Peterson • Justin Sweitzer • Nausheen Alshehab

**11:30 AM DEVELOPING A SYMMETRIC RADIALY FIRING WARHEAD WITH MULTIMODE
EFFECTS**

Brian Pavlovic
US Army RDECOM-ARDEC, Picatinny, NJ

Yinhua Wu • Peter Rottinger

11:50 PM LONG STANDOFF JET PERFORMANCE FOR SHAPED CHARGES OF INTEREST

Richard Mudd
U.S. Army Research Laboratory APG, MD

Steven Boyer

**12:10 PM LUNCH
HERMANN HALL BALLROOM**

1:10 PM SESSION II (CONTINUED)

1:15 PM PLANAR SHAPED CHARGE JETS

Jeremy Kleiser
US Air Force Research Laboratory, Eglin AFB, FL

David Lambert

1:35 PM INVITED ADDRESS

Ann E. Rondeau, Ed.D.,
Vice Admiral, U.S. Navy (Ret.), President, Naval Postgraduate School

**1:55 PM SHAPED CHARGE LINER AFFORDABILITY INITIATIVE FOR AGM-114R
MULTIPURPOSE WARHEAD**

Brian Doyal
General Dynamics Ordnance and Tactical Systems, Niceville, FL

Michael Steinberg • Dan Boeka

SESSION III: ENERGETICS – EXPLOSIVES AND PROPELLANTS

**2:15 PM SESSION INTRODUCTION
GLASGOW 102**

Jessica Tobin
Naval Air Warfare Center, China Lake, CA
Session Chair

Kyle Mychajlonka
Nammo Talley Inc., Mesa, AZ
Session Chair

**2:20 PM SENSITIVITY OF SHAPED-CHARGE WARHEAD PERFORMANCE TO VARIATION IN
EXPLOSIVE CHARACTERISTICS**

Brian Doyal
General Dynamics Ordnance and Tactical Systems, Niceville, FL

Michael Steinberg • Jamie Neidert • Cynthia Buford

- 2:40 PM** **FUTURE MIL-STD-1316 COMPLIANT CL-20 BASED INITIATION FORMULATIONS USING COUPLED MICROSTRUCTURE, INITIATION AND SPALL CHARACTERISTICS**
- Eric Welle
US Air Force Research Laboratory, Eglin AFB, FL
- Jonathan Essel • Knepper • Dodson
- 3:00 PM** **THE ADDITIVE MANUFACTURING OF 20 MM ELECTRIC ACTUATED GUN PRIMERS THROUGH THE DAPR DAN PROJECT WITH REACTIVE NANOCOMPOSITE INKS**
- Jonathan Essel
Naval Air Warfare Center, China Lake, CA
- Zachary Doorenbos, • Matthew Kubik • Alicia Hughes
- 3:20 PM** **COFFEE BREAK**
GLASGOW HALL COURTYARD
- 3:40 PM** **REVIEW OF AGENT DEFEAT WEAPONS TESTING, TARGETS AND PHENOMENOLOGY**
- James Black
DTRA RD-CXW, Eglin AFB, FL
- 4:00 PM** **PARAMETER DESIGN STUDY OF AN EXPLOSIVELY DRIVEN GUN USING CTH AND DAKOTA**
- Nathan Reichenbach
U.S. Army Research Laboratory APG, MD
- Paul Conroy • Richard Summers • Joseph Koby
- 4:20 PM** **COUPLED MODELING, SIMULATION AND EXPERIMENTATION BASED DESIGN OF AN EXPLOSIVE TRAIN**
- Eric Welle
US Air Force Research Laboratory, Eglin AFB, FL
- J. Davis • R. Kelleher • M. Meadows • A. Diggs
- 4:40 PM** **ADJOURN**
- 5:00 – 7 PM** **RECEPTION**
HYATT REGENCY MONTEREY HOTEL AND SPA IN MONTEREY

WEDNESDAY, JULY 31, 2019

7:00 AM REGISTRATION AND SECURITY CHECK-IN
NAVAL POSTGRADUATE SCHOOL, GLASGOW HALL COURTYARD

8:00 AM INVITED PRESENTATION

US Army Colonel John Rafferty
Long Range Precision Fires CFT

SESSION IV: BALLISTICS

8:30 AM SESSION INTRODUCTION
GLASGOW 102

Donald Carlucci
US Army Futures Command, Picatinny Arsenal, NJ
Session Chair

8:35 AM INNOVATIVE NITROGEN-DOPED BORON PROPELLANTS, PART II-25MM GUN
FIRINGS AND CHARACTERIZATIONS

Thelma Manning
US Army RDECOM-ARDEC, Picatinny, NJ

Michael Fair • Viral Panchal • Eugene Rozumov • James Barnes • Paul Matter

8:55 AM USE OF A CONTROL MAP TO MAXIMIZE MANEUVER FOOTPRINT OF BALLISTICS-
CORRECTED GUIDED PROJECTILES

Paul Zemaný
BAE Systems Information & Electronic Systems Integration, Inc., Hudson, NH

Matt Chrobak • Egor Degtiarev

9:15 AM ENHANCED M940 MPT-SD CARTRIDGE LETHALITY AND BALLISTIC
PERFORMANCE

David Rophael
Combat Capabilities Development Command - Armaments Center, Picatinny Arsenal, NJ

Nicole Sapp

9:35 AM DEVELOPMENT OF A TEST STAND FOR HIGH SPIN RATE TESTING OF
ARTILLERY ROCKET MOTORS

Logan McLeod
National Technical Systems

Seth Siddle-Mitchell • Daniel Vo • Ductri Nguyen

- 9:55 AM** **FLUID-STRUCTURE INTERACTION COMPUTATIONAL MODELING AND EXPERIMENTATION ON LOW-MACH EXTERNAL BALLISTICS**
- William Schwartz
Northrop Grumman Innovation Systems, Plymouth, MN
- 10:15 AM** **COFFEE BREAK**
GLASGOW HALL COURTYARD
- 10:35 AM** **DEFEATING SHOT LOCALIZATION WITH SMALL ARMS LOW NOISE SUPERSONIC PROJECTILE**
- Greg Kangas
GREAT LAKES SOUND AND VIBRATION INC., Houghton, MI
- 10:55 AM** **A SUMMARY OF THE REAPR (RECORDER FOR EMBEDDED ACCELERATION AND PRESSURE RESPONSE) INSTRUMENTATION TESTING AND CAPABILITIES**
- David Truncellito
Applied Research Associates, Albuquerque, NM
- 11:15 AM** **AUTO-CATALYTIC HEAT GENERATION OF FOAMED CELLULOID COMBUSTIBLE CASES IN 120MM TANK AMMUNITION**
- Samantha Scutti
Combat Capabilities Development Command - Armaments Center, Picatinny Arsenal, NJ
- Brian Hunter • Jeff Krug • Viral Panchal

SESSION V: ENERGETICS – REACTIVE MATERIALS

- 11:35 AM** **SESSION INTRODUCTION**
GLASGOW 102
- Alexandra Reinert
NSWC IHEODTD, Indian Head, MD
Session Chair
- Nydeia Bolden
US Air Force Research Laboratory, Eglin AFB, FL
Session Chair
- 11:40 AM** **ANALYTIC MODELS FOR THE ENERGY RELEASE OF REACTIVE MATERIALS**
- Joseph Hooper
Naval Post Graduate School, Monterey, CA
- Jacob Kline • Christopher Milby
- 12:00 PM** **LUNCH**
HERMANN HALL BALLROOM
- 1:00 PM** **SESSION V (CONTINUED)**

1:05 PM NEUTRALIZATION OF HOME-MADE EXPLOSIVE MATERIAL BY WAY OF REACTIVE MATERIALS

Paul Redner
US Army RDECOM-ARDEC, Picatinny, NJ

Robert Koch • Richard Fong • Deepak Kapoor

1:25 PM CHARACTERIZATION OF BARRIER THICKNESS FOR REACTIVE FRAGMENT ENERGY RELEASE

Anne Kyner
NSWC Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD

1:45 PM COMPUTATIONAL MODELING OF HIGH-DENSITY REACTIVE MATERIALS

Thomas McGrath
NSWC Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD

James Warner • Cameron Stewart • Jason Hackl

2:05 PM CONCOMITANT 3D PRINTING OF NANOSTRUCTURED METAL AND POLYMERS FOR ENERGETIC APPLICATIONS

David Thomas
ASU Research Enterprise, Scottsdale, AZ

Bruno Azeredo

2:25 PM CHARACTERIZATION OF FRAGMENTATION AND ENERGY RELEASE BEHAVIOR OF REACTIVE METAL COMPOSITES

Michael J. Hargather
New Mexico Tech / EMRTC, Socorro, NM

Jamie Kimberley • Steven Thoma • Phil Martellaro

**2:45 PM COFFEE BREAK
GLASGOW HALL COURTYARD**

SESSION VI: WARHEADS – BLAST AND FRAGS

**3:05 PM SESSION INTRODUCTION
GLASGOW 102**

Daniel Suarez
US Army Futures Command, Picatinny Arsenal, NJ
Session Chair

Joseph DeGezelle
Northrop Grumman Innovation Systems, Plymouth, MN
Session Chair

- 3:10 PM CONFORMAL PANEL WARHEAD FOR AERO-HEATED AIR-TO-GROUND MISSILES**
- Michael Denigan
US Air Force Research Laboratory, Eglin AFB, FL
- Michael Murphy • Darin L. Kielsmeier • John Granier
- 3:30 PM LETHALITY ANALYSIS TECHNIQUES FOR FRAGMENTATION PANEL WARHEADS**
- Eric L. Scarborough
US Air Force Research Laboratory, Eglin AFB, FL
- Michael Denigan • Samuel Tipton
- 3:50 PM SPEAR WARHEAD DEVELOPMENT**
- Sean Treadway
Corvid Technologies, Mooresville, NC
- Mike Worsham • Todd Hadley
- 4:10 PM BLAST OVERPRESSURE MODELING OF COMPLEX TARGETS FOR PERSONNEL LETHALITY ANALYSIS IMPROVEMENT**
- John M. Steen
US Army CCDC Aviation and Missile Center, Redstone Arsenal, AL
- Jon M. Kilpatrick • Allen W. Pike • Gustavo Emmanuelli
- 4:30 PM OPTICAL DIAGNOSTICS APPLIED TO DETONATION AND FRAGMENTATION OF THE MK 84 MUNITION**
- Phillip Reu
Sandia National Laboratories, Albuquerque, NM
- Russell Teeter • Mark Anderson • Daniel Guildenbeche
- 4:50 PM NUMERICAL MODELING OF THE DETONATION AND FRAGMENTATION OF THE MK 84 MUNITION**
- Russell Teeter
Sandia National Laboratories, Albuquerque, NM
- Phillip Reu • Daniel Rogers • Steven Attaway
- 5:10 PM ADJOURN**

THURSDAY, AUGUST 1, 2019

7:00 AM REGISTRATION AND SECURITY CHECK-IN
NAVAL POSTGRADUATE SCHOOL, GLASGOW HALL COURTYARD

8:00 AM INVITED PRESENTATION JEMTP STATUS

Stanley DeFisher
US Army RDECOM-ARDEC, Picatinny, NJ

SESSION VI: WARHEADS – BLAST AND FRAGS (CONTINUED)

8:30 AM SESSION INTRODUCTION
GLASGOW 102

Daniel Suarez
US Army Futures Command, Picatinny Arsenal, NJ
Session Chair

Joseph De Gezelle
Northrop Grumman Innovation Systems, Plymouth, MN
Session Chair

8:35 AM LOW COLLATERAL WARHEAD DESIGN AND EXPERIMENT

Chandler Clough
U.S. Army Research Laboratory APG, MD

Jason Davis • Drew Marable • Darin Kielsmeier • Adolphus McDonald

8:55 AM ADDITIVE MANUFACTURING OF AF9628 STEEL FOR ORDNANCE APPLICATIONS

Erin Hager
CCDC AvMC, Redstone Arsenal, AL

Ryan O'Hara • Philip Flater • Ryan Kemnitz,

9:15 AM ADVANCED DATA COLLECTION FOR NON-TRADITIONAL MUNITIONS

James Mathis
Southwest Research Institute, San Antonio, TX

David Stevens • David Hogg • Robert Tynan

**9:35 AM PARTICLE IMAGE VELOCIMETRY AND ITS ADVANTAGES IN IMAGING
MULTIPHASE**

Charles M. Jenkins
US Air Force Research Laboratory, Eglin AFB, FL

9:55 AM ENHANCED TERMINAL EFFECTS: A TECHNOLOGY DEMONSTRATION

Andrew C. Ihnen
NSWC Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD

Samuel B. Emery • Kevin W. Genson • Clark R. Newbold

**10:15 AM COFFEE BREAK
GLASGOW HALL COURTYARD**

**10:35 AM SECOND GENERATION AEROSTABLE PENETRATOR TECHNOLOGY
DETONATION TESTING**

David Bittle
US Army RDECOM-ARDEC, Picatinny, NJ

David Kafrouni

10:55 AM KINETIC ENERGY WARHEAD (KEWH) DEVELOPMENT

Matt Rontti
Northrop Grumman Innovation Systems (NGIS), Plymouth, MN

11:15 AM INVITED PRESENTATION - WEAPONIZED SUAS TRENDS

Chris Gstattenbauer
NGIC, Charlottesville, VA

SESSION VII: PROTECTION SYSTEMS

**11:45 AM SESSION INTRODUCTION
GLASGOW 102**

Joel Stewart
US Army Research Lab, APG, MD
Session Chair

11:50 AM LOW-COLLATERAL ANTI-ROCKET-PROPELLED GRENADE (RPG) WARHEADS

Vincent Schuetz
Naval Air Warfare Center, China Lake, CA

**12:10 PM LUNCH
HERMANN HALL BALLROOM**

1:10 PM SESSION VII (CONTINUED)

**1:15 PM ANALYTIC SHAPED-CHARGE CODE DEVELOPMENT WITH FORMATION,
PROPAGATION, BREAKUP, AND PENETRATION CALCULATIONS**

Justin Sweitzer
Practical Energetics Research, Inc., Huntsville, AL

Paul Reitmeier

- 1:35 PM COMPUTATIONAL DESIGNS TO TAILOR THE VELOCITY OF EXPLOSIVELY
DRIVEN PLATES IN EXPLOSIVE REACTIVE ARMORS**
- Joel Stewart
U.S. Army Research Laboratory APG, MD
- 1:55 PM LATERAL-CONFINEMENT EFFECTS ON THE BALLISTIC RESPONSE TO
RELEVANT SMALL-ARMS THREATS OF CERAMICS HAVING SMALL THICKNESS
AND LATERAL DIMENSION**
- Jason McDonald
U.S. Army Research Laboratory APG, MD
- Andrew Tonge • Sikhanda Satapathy
- 2:15 PM COMPUTATIONAL SIMULATION OF SHATTER GAP IN HARD ARMOR**
- Christopher Freitas
Southwest Research Institute, San Antonio, TX
- 2:35 PM AN ANALYSIS OF BALLISTIC HELMET PROTECTION AND SKULL FRACTURE
PATTERNS**
- Erika A. Matheis
Bennett Aerospace, Cary, NC
- Samantha L. Wozniak • Ashley E. Eidsmore • Karin A. Rafaels
- 2:55 PM FRACTURE/FAILURE BEHAVIOR, AND BALLISTIC PERFORMANCE OF VARIOUS
SILICON CARBIDE CERAMIC MATERIALS IN LIGHTWEIGHT
CERAMIC/COMPOSITE LAMINATE ARMORS**
- Mark D. Andrews
U.S. Army Research Laboratory APG, MD
- Lee S. Magness • James Campbell
- 3:15 PM ADJOURN**

ALTERNATE SESSIONS

SESSION I: PENETRATION MECHANICS

NONE

SESSION II: WARHEAD TECHNOLOGY – SHAPED CHARGE AND EFP

MULTI ROLE WARHEAD CHARACTERIZATION

Becca Loudin
CCDC AvMC, Redstone Arsenal, AL

Brent Deerman • Darin Kielsmeir

ANALYSIS AND DESIGN OF A COUNTER-UNMANNED AIRCRAFT SYSTEM (C-UAS) WARHEAD

Brian Pavlovic
US Army RDECOM-ARDEC, Picatinny, NJ

Henry Hsieh • Peter Rottinger • Lamar Thompson

ANTI-ARMOR WARHEAD DESIGN WITH FORWARD FRAGMENTATION

Drew Marable
Practical Energetics Research, Inc., Huntsville, AL

Paul Reitmeier • Scott Amos

TESTING AND EVALUATION OF VIPER WARHEADS LOADED WITH FEM LX-14 EXPLOSIVE

Arthur S. Daniels
Practical Energetics Research, Inc., Huntsville, AL

Nicholas R. Peterson • Nausheen Al-Shehab

DEVELOPMENT AND TESTING OF A HIGHER PERFORMANCE LINEAR SHAPED CHARGE FOR DEMILITARIZATION OF UXO

Stanley DeFisher
US Army RDECOM-ARDEC, Picatinny, NJ

Gregory Stunzenas • Bill Adams • Erik Wrobel

GATOR LANDMINE WARHEAD CHARACTERIZATION AND REPLACEMENT APPROACH

Gawain Chan
U.S. Army RDECOM-ARDEC, Picatinny, NJ

Edward W. Chin • Peter Rottinger • Brian Pavlovic

EVALUATION OF A 2.75" DIAMETER HIGH-EXPLOSIVE ANTI-TANK (HEAT) TANDEM SHAPED CHARGE WARHEAD DESIGN CONCEPT WITH ANTI-PERSONNEL ANTI-ARMOR (APAM) CAPABILITIES

Edward Lustig
NSWC Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD

Jonathan Millan

WARHEAD PERFORMANCE OF ARMY MISSILE SYSTEMS AGAINST ARMORED TARGETS

Scott Hill
Practical Energetics Research, Inc., Huntsville, AL

Darin Kielsmeier • Rebecca Turner • Kim Williams

SESSION III: ENERGETICS – EXPLOSIVES AND PROPELLANTS

NONE

SESSION IV: BALLISTICS

MOTION MEASUREMENT PACKAGE

Anthony Opperman
Orbital Research

Edward Rapp

PROPULSION DEVELOPMENT FOR 120-MM M865A1 TANK CARTRIDGE

Adriana Eng
US Army RDECOM-ARDEC, Picatinny, NJ

Manfredi Luciano • Brian Wong • Hany Malek • Vinod Nagori

CURVED TRAJECTORY GRENADE LAUNCHER

Chris Fortunato
ASU Research Enterprise, Scottsdale, AZ

Lloyd Brown

SESSION V: ENERGETICS – REACTIVE MATERIALS

NOVEL TECHNIQUES FOR INVESTIGATING ENERGY RELEASE AND THE COMBUSTION OF REACTIVE MATERIAL FRAGMENTS

Alexandra A. Reinert

NSWC Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD

Anne Kyner

LETHALITY ASSESSMENT OF THE HIGH-DENSITY REACTIVE MATERIAL (HDRM) ENHANCED WARHEAD FOR THE 57MMMK332 MOD 0 GUIDED ROUND

Thoai Nguyen

Naval Surface Warfare Center, Dahlgren Division, Dahlgren, VA

Dan Piwowar • James Sambrook • Erika Wood

SESSION VI: WARHEADS – BLAST AND FRAGS

EXPLOITING ELECTRICAL POWER DELIVERY DEVICES FOR DAMAGE MECHANISMS

Jeremy Kleiser

US Air Force Research Laboratory, Eglin AFB, FL

Ian Kowalczyk • David Pugh • Jason Gilliam

ADVANCED MORTAR WARHEAD DEVELOPMENT

Joseph DeGezelle

Northrop Grumman - Innovation Systems Sector, Plymouth, MN

BLU-139/B 500 LB. PENETRATOR

Derek Plymate

Northrop Grumman - Innovation Systems Sector, Plymouth, MN

**A BODY ARMOR MODEL TO EVALUATE CHANGE OF BACK FACE DEFORMATION
REQUIREMENT**

Sikhanda Satapathy
U.S. Army Research Laboratory APG, MD

Timothy Zhang • Jason McDonald • Brian Schuster

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GENERAL DYNAMICS Ordnance and Tactical Systems

General Dynamics Ordnance and Tactical Systems (GD-OTS) designs and produces advanced warhead systems of all types, including shaped charge, blast fragmentation, area attack, and penetrator warheads. The company is a leader in the development and manufacture of large-, medium- and small-caliber direct and indirect-fire ammunition; as well as mortar systems, gun systems, and lightweight tactical vehicles. GD-OTS designs and manufactures composite structures, precision metal components, and control actuation systems for missiles and rockets; and for numerous commercial and aerospace applications. The company also develops and produces propellants and powder for a variety of defense and commercial applications.

NETWORKING BREAK SPONSORS



Upcoming National Armaments Consortium Collaboration Opportunities

DoD Ordnance Technology Consortium (DOTC) 19-05
Collaboration Event
August 20-21, 2019
Parsippany, NJ
www.nacconsortium.org

NSTIC Industry Day
September 4, 2019
Fredericksburg, VA
www.nstic.org

AMTC Collaboration Event
February 2020
Huntsville, AL
www.amtcenterprise.com

